



# Comparing the achievement patterns of Native Hawaiian and non-Native Hawaiian grade 8 students in reading and math





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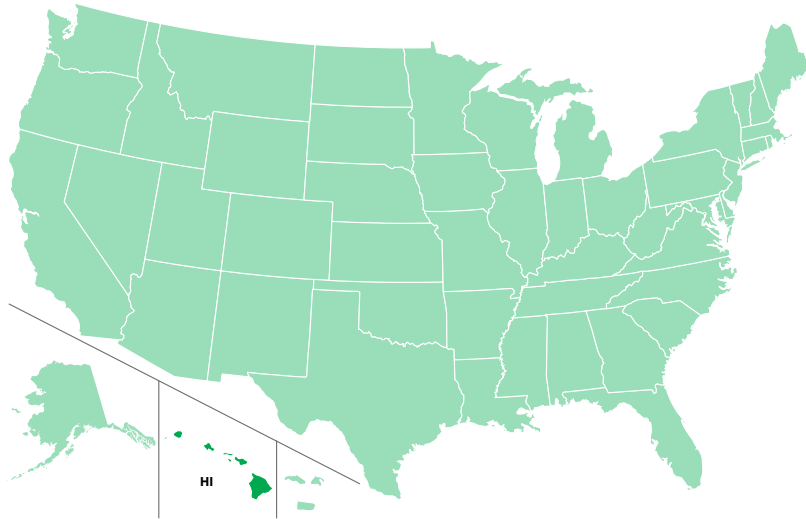
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# Comparing the achievement patterns of Native Hawaiian and non-Native Hawaiian grade 8 students in reading and math

**Over 2003/04–2008/09, grade 8 Native Hawaiian students had lower proficiency rates than non-Native Hawaiian students in both reading and math. The achievement gap narrowed in reading but widened in math from 2004/05 to 2008/09.**

Unlike Native American groups in other states, Native Hawaiian students represent the largest single ethnic group in Hawaii, at 27 percent of the student population in 2008/09. Since at least the 1980s, the achievement of Native Hawaiian students on state assessments has lagged behind that of other students in the state (Kana'iaupuni, Malone, and Ishibashi 2005a). Identifying trends in achievement gaps between these students and others is important for improving overall achievement.

This study parallels a recent study by 8 of the 10 Regional Educational Laboratories on the achievement of grade 8 American Indian and Alaska Native students in 26 states (Nelson, Greenough, and Sage 2009). Initially, that study was to include Native Hawaiians, but since Hawaii was the only state that collected data at the level necessary to analyze achievement trends for these students, this separate study was conducted for Hawaii. This study reports the reading and math proficiency rates of grade 8 Native Hawaiian and non-Native Hawaiian public school students and whether

proficiency rates have changed from 2003/04 to 2008/09.

To assess reading and math proficiency, the Hawaii Department of Education administers the standards-based Hawaii State Assessment (HSA) each spring to public school students in grades 3–8 and 10. Performance on the HSA is reported at four levels: well below proficiency, approaches proficiency, meets proficiency, and exceeds proficiency (see table A1 in appendix A of the main report). Each level is defined by a score range. Students are considered proficient if they achieve either the meets proficiency or exceeds proficiency level.

This study's inclusive definition of "Native Hawaiian" as anyone identified in the Hawaii Department of Education system as either Hawaiian or part-Hawaiian is consistent with definitions in federal legislation (Hammond 1988). Although the Hawaii Department of Education collects data on the race/ethnicity of all students, it does not report HSA results by race/ethnicity, instead including Hawaiian and part-Hawaiian in the category "Native Hawaiian and other Pacific Islander" (which also includes Chinese, Filipino, Indo-Chinese, Japanese, Korean, and Samoan students). For this study, the Hawaii Department of Education provided HSA data for Hawaiian and part-Hawaiian students as one group and for

all other (non-Native Hawaiian) students as another group.

The following research question guided this study:

- How did the reading and math achievement of grade 8 Native Hawaiian students attending public schools in Hawaii differ from that of non-Native Hawaiian students, and how did achievement gaps between Native Hawaiian and non-Native Hawaiian students vary from 2003/04 to 2008/09?

Key findings include:

- In each study year, grade 8 non-Native Hawaiian students had higher proficiency rates than did Native Hawaiian students in both reading and math.
- From 2004/05 to 2008/09, the achievement gap narrowed in reading (from 19.5 percentage points to 15.6) and fluctuated in math (from a high of 20.7 percentage points to a low of 14.4).
- The proficiency rates of both Native Hawaiian and non-Native Hawaiian students increased from 2003/04 to 2008/09, rising 31.3 percentage points for Native Hawaiian students and 28.4 for non-Native Hawaiian students in reading and 16.7 percentage points for Native Hawaiian students and 19.9 for non-Native Hawaiian students in math.
- Both Native Hawaiian and non-Native Hawaiian students had higher overall proficiency rates in reading than in math in each study year.

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**Over 2003/04–2008/09, grade 8 Native Hawaiian students had lower proficiency rates than non-Native Hawaiian students in both reading and math. The achievement gap narrowed in reading but widened in math from 2004/05 to 2008/09.**

## WHY THIS STUDY?

Native Hawaiian students represent the largest single ethnic group in Hawaii, at 27 percent of the student population in 2008/09. Since at least the 1980s, the achievement of Native Hawaiian students on state assessments has lagged behind that of other students in the state (Kana'iaupuni, Malone, and Ishibashi 2005a). Identifying trends in achievement gaps between these students and others is important for improving overall achievement levels.

This study parallels a recent study by 8 of the 10 Regional Educational Laboratories on the achievement

of grade 8 American Indian and Alaska Native students in 26 states (Nelson, Greenough, and Sage 2009). Initially, that study was to include Native Hawaiian students, but since Hawaii was the only state that collected data at the level necessary to analyze achievement trends for these students, this separate study was conducted for Hawaii. The methodology for this study, including the focus on grade 8, was designed to be consistent with Nelson, Greenough, and Sage (2009).

Researchers have documented achievement gaps between Native Hawaiian and non-Native Hawaiian students for almost 30 years (Kamehameha Schools/Bernice Pauahi Bishop Estate 1983; Kamehameha Schools/Bernice Pauahi Bishop Estate 1993; Kana'iaupuni, Malone, and Ishibashi 2005a). The gaps have persisted despite changes in assessment methods and in many social indicators (see box 1 on the persistence of the achievement gap).

The Hawaii Department of Education wants to know more about the academic achievement of Native Hawaiian students, as the achievement of the state's largest single racial/ethnic group of students affects proficiency rates statewide and achievement of annual measurable objectives (see box 2 for definitions of key terms). The results of this study are intended to inform ongoing analyses of achievement gaps among nationally recognized student minority groups, including American Indian, Alaska Native, and Native Hawaiian.

## The Native Hawaiian student population

The way Native Hawaiians are counted has changed over time and varies by state agency. This study's inclusive definition of "Native Hawaiian" as anyone identified in the Hawaii Department of Education system as Hawaiian or part-Hawaiian is consistent with definitions in federal legislation (Hammond 1988) and with Hawaiian practice.<sup>1</sup> When students enroll in Hawaiian public schools, they self-identify or are identified by their parents as one of 14 racial/ethnic categories, including "Hawaiian" and "part-Hawaiian." This study combines these two categories.



## BOX 1

**The persistence of the achievement gap between Native Hawaiians and non-Native Hawaiians**

Native Hawaiians in Hawaii are concerned about their children's academic achievement. The Hawaii Department of Education is also concerned, as the achievement of the largest single racial/ethnic group in the student population strongly affects how the state as a whole fares.

Booz Allen Hamilton (1961) conducted one of the earliest studies of Native Hawaiian education, under contract with Kamehameha Schools. The study did not report differences on achievement assessments but did report that the number of Native Hawaiian students would grow, leading to these students representing an increasing percentage of the Hawaiian student population. The Native Hawaiian Educational Assessment of 1983 found that Native Hawaiian students scored disproportionately lower than their non-Native Hawaiian peers on standardized reading and math assessments (Kamehameha Schools/Bernice Pauahi Bishop Estate 1983). Two later studies found evidence of achievement gaps and minimal gains for Native Hawaiian students in conventional public schools (Kamehameha Schools/Bernice Pauahi Bishop Estate 1993; Kana'iaupuni, Malone, and

Ishibashi 2005a). Efforts to close the gaps included the federally funded Native Hawaiian Education Act, authorized by the U.S. Congress in 1988 to address disparities in the achievement of Native Hawaiian students and now part of the Elementary and Secondary Education Act legislation (Elementary and Secondary Education Act, Title VII, Section 7207).

Kana'iaupuni, Malone, and Ishibashi (2005a) documented achievement gaps between Native Hawaiian students and their non-Native counterparts over 1998–2002, using data from the statewide assessment instrument then in use, the SAT-9. The report concluded that on standardized measures of achievement, reading and math scores were lower among Native Hawaiian students than among non-Native Hawaiian students. Based on national norms, the achievement gap in reading between Native Hawaiian and non-Native Hawaiian students remained between 14 and 17 percentage points during the years studied and that in each grade tested, the average math scores of Native Hawaiian students lagged behind state averages by 11–15 percentage points.

Addressing achievement gaps is important at the federal, state, and community levels. The Native Hawaiian Education Act (NHEA) of 1988 defined Native Hawaiians as a “distinct and unique indigenous people

with a historical continuity to the original inhabitants of the Hawaiian archipelago.” The NHEA authorized funds to develop educational and vocational curricula that incorporate Hawaiian knowledge and to research and evaluate the education status and needs of Native Hawaiians. In 2001, Congress reauthorized the NHEA as Title VII Part B of the Elementary and Secondary Education Act (the No Child Left Behind Act of 2001). The reauthorization cited findings from Kamehameha Schools/Bernice Pauahi Bishop Estate (1993), which showed that despite state and federal funding initiatives, gaps persisted between Native Hawaiian and non-Native Hawaiian students. The NHEA, as well as Title V Part D.12 in the No Child Left Behind Act of 2001, provides for “innovative educational programs to assist Native Hawaiians.”

Another concerned constituency is the national Council of Chief State School Officers, which in 2004 formed a network of 22 state education agencies with the vision of “each American Indian, Alaska Native, and Native Hawaiian student achieving their full potential, while maintaining their cultural identity, through culturally responsive education” (as cited in Nelson, Greenough, and Sage 2009, p. 2). One of the network's goals is to annually increase the academic achievement of American Indian, Alaska Native, and Native Hawaiian students consistent with their non-native peers.

Native Hawaiian students represent the largest single subgroup, at 26.9 percent of the grade 8 student population for 2008/09 (table 1). That proportion varied less than 1 percentage point over the study period. This is a larger reported

percentage of grade 8 native students than in any other state. In 2006/07, Alaska had the second largest proportion, at 25.9 percent, and Oklahoma had the third largest, at 20.1 percent (Nelson, Greenough, and Sage 2009).



## BOX 2

**Key terms**

*Annual measurable objectives.* The student proficiency targets that schools, districts, and states must meet under the No Child Left Behind Act of 2001. Though the intermediate targets are set by each state, all states must reach 100 percent proficiency by 2013/14.

*Hawaii Content and Performance Standards (HCPS).* A set of standards first published in 1994 by the Hawaii Content and Performance Standards Commission, established by the state legislature in 1991. Revisions were published in 1998 (HCPS II) and 2004 (HCPS III).

*Hawaii State Assessment (HSA).* A standards-based assessment that

measures how well students meet state grade-level standards in reading and math. Administered to public school students in grades 3–8 and 10, the HSA was revised in 2006/07 to reflect changes made in 2004 to the state standards (HCPS III); cutscores were also revised (see appendix A).

*Native Hawaiian.* Any student who can trace his or her ancestry to the indigenous inhabitants of the Hawaiian Islands. This study considers individuals who are of part-Hawaiian ancestry to be Native Hawaiian. Data on student ancestry are as reported by students or their parents to the Hawaii Department of Education.

*No Child Left Behind Act of 2001.* The law that reauthorized and revised the federal Elementary and Secondary

Education Act. It provides more federal education funds and includes stronger requirements for states that accept these funds to demonstrate progress in raising student achievement, increasing teacher qualifications, and narrowing achievement gaps between advantaged and disadvantaged students.

*Proficiency levels.* Performance on the HSA is reported at four levels: well below proficiency, approaches proficiency, meets proficiency, and exceeds proficiency. Each level is defined by a cutscore and a score range (see table A1 in appendix A).

*Proficient.* Students are considered proficient if they achieve either the meets proficiency or exceeds proficiency level on the HSA.

TABLE 1

**Race/ethnicity of students in the Hawaii Department of Education dataset, 2008/09**

Student race/ethnicity	Percent
Native Hawaiian <sup>a</sup>	26.9
Filipino	21.1
White	12.6
Japanese	8.7
Samoan	3.5
Hispanic	3.4
Chinese	3.1
Black	2.4
Portuguese	1.3
Korean	1.2
Indo-Chinese	1.0
American Indian	0.6
Other	14.4
Total	100

*Note:* Data are as of August 31, 2009, and are based on student self-reports or parent identification.

a. Combines “Hawaiian” and “part-Hawaiian,” as defined in box 2 and consistent with the definition in the No Child Left Behind Act of 2001.

*Source:* Hawaii Department of Education 2009.

### Research question

The following research question guided this study:

- How did the reading and math achievement of grade 8 Native Hawaiian students attending public schools in Hawaii differ from that of non-Native Hawaiian students, and how did achievement gaps between Native Hawaiian and non-Native Hawaiian students vary from 2003/04 to 2008/09?

The data for this study, provided by the Hawaii Department of Education, were drawn from the Hawaii State Assessment (HSA) results for grade 8 public school students for 2003/04–2008/09 (see box 3 and appendix A for data sources and analysis).

## STUDY FINDINGS

In each study year 2003/04–2008/09, Native Hawaiian grade 8 students had lower overall

<div> <div>BOX 3</div> <div>Data and study methods</div> <div> <p><i>Data.</i> The primary data source for this study was the results of the standards-based Hawaii State Assessment (HSA) for grade 8 students for 2003/04–2008/09. Those data were provided by the Hawaii Department of Education. Although the department collects data on the race/ethnicity of all students, it does not report HSA results by race/ethnicity at the student level and instead includes Hawaiian and part-Hawaiian in the category “Native Hawaiian and other Pacific Islander” (which also includes Chinese, Filipino, Indo-Chinese, Japanese, Korean, and Samoan students). For this study, the department divided HSA data into two groups: Hawaiian and part-Hawaiian students in one group and all other (non-Native Hawaiian) students in another group.</p> <p>To determine reading and math proficiency, the Hawaii Department of Education administers the HSA</p> </div> </div>	<div> <p>each spring to students in grades 3–8 and 10. Performance on the HSA is reported at four levels: well below proficiency, approaches proficiency, meets proficiency, and exceeds proficiency. Each level is defined by a score range, differentiated by cutscores (see table A1 in appendix A). The HSA was revised in 2006/07 to reflect changes made in 2004 to the state standards (HCPS III); cutscores were also changed. Students are considered proficient if they achieve either the meets proficiency or exceeds proficiency level on the assessment.</p> <p><i>Analysis.</i> Data tables from the Hawaii Department of Education contained both numbers and percentages of students scoring at each proficiency level. Percentages were calculated based on the numbers of Native Hawaiian and non-Native Hawaiian students tested each year.</p> <p>The first analysis merged the top two proficiency levels (meets proficiency and exceeds proficiency) to create a single proficiency rate for comparison</p> </div>	<div> <p>across years, following the methodology of Nelson, Greenough, and Sage (2009). This is also how state data are submitted to the U.S. Department of Education in the Consolidated State Performance Plans, as required under the No Child Left Behind Act.</p> <p>Next, the proficiency rates for grade 8 reading and math were plotted over 2003/04–2008/09, comparing the performance of Native Hawaiian and non-Native Hawaiian students with annual measurable objectives. These graphs can be compared with the state findings in Nelson, Greenough, and Sage (2009). Because the data represent the universe of students in grade 8 in Hawaii for each year, inferential statistics are not required for demonstrating trends.</p> <p>Finally, going beyond Nelson, Greenough, and Sage (2009), two graphs were created to display the percentages of Native Hawaiian and non-Native Hawaiian students at each proficiency level in reading and math.</p> </div>
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proficiency rates (meets proficiency and exceeds proficiency combined) than did their non-Native Hawaiian peers in both reading and math. Gaps in the percentage of students scoring at the overall proficiency level ranged from 15.6 to 19.5 percentage points in reading and from 14.4 to 18.4 percentage points in math. When disaggregating the data to all four proficiency bands, the largest gaps between Native Hawaiian and non-Native Hawaiian students were at the exceeds proficiency level in reading and at the well below proficiency and exceeds proficiency levels in math.

Differences in proficiency rates were evident after 2006/07, when the HSA was revised to reflect changes in state standards (HCPS III); cutscores were also revised. Though gaps remained,

proficiency levels improved for both Native Hawaiian and non-Native Hawaiian students between the first three years of the study (when the HSA reflected HCPS II) and the last three years (when the HSA reflected HCPS III), with increases in the percentage of students scoring proficient.

Overall, the percentages of Native Hawaiian and of non-Native Hawaiian students scoring proficient increased at comparable rates, but the achievement gap narrowed in reading and widened in math.

Because the HSA for the three most recent study years is tied to the current state standards (HCPS III), the study looked more closely at trends over 2006/07–2008/09. In reading, the gap between Native Hawaiian and non-Native Hawaiian

students widened at the exceeds proficiency level, where gaps were also largest, and narrowed at the meets proficiency level. The gap in overall reading proficiency (meets or exceeds proficiency) narrowed as well.

In math, the gap between Native Hawaiian and non-Native Hawaiian students also widened over 2006/07–2008/09 at the levels where the differences in rates were greatest—at the exceeds proficiency and well below proficiency levels. Only at the meets proficiency level did the gap narrow. This appears to be related to the widening gap at the exceeds proficiency level rather than to improving performance by Native Hawaiian students. More than half of Native Hawaiian students scored at the well below proficiency level in each of the last three study years.

On both the 2003/04–2005/06 HSAs and the 2006/07–2008/09 HSAs, both Native Hawaiian and non-Native Hawaiian students performed better in reading than in math when measured against the state’s annual measurable objectives.

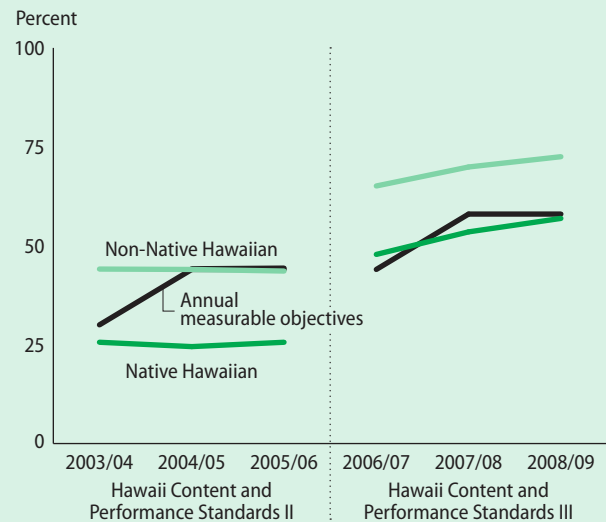
### Gaps and trends in overall reading and math proficiency

**Reading.** Non-Native Hawaiian students had higher reading proficiency rates than did Native Hawaiian students in all six study years (figure 1). The gap varied across the study years, from a high of 19.5 percentage points in 2004/05 to a low of 15.6 percentage points in 2008/09.

Reading proficiency rates rose over the study period among both Native Hawaiian and non-Native Hawaiian students, by a similar amount—from 25.6 percent to 56.9 percent (31.3 percentage points) for Native Hawaiian students and from 44.1 percent to 72.5 percent (28.4 percentage points) for non-Native Hawaiian students. The higher rates cannot be interpreted as increased proficiency levels, however, since the improvement might have been due in part to the change in standards from the HCPS II to the HCPS III and the associated changes in the HSA (see appendix A). Thus the analysis focuses on results trends for each

FIGURE 1

#### Reading proficiency rates for grade 8 Native Hawaiian and non-Native Hawaiian students on the Hawaii State Assessment, 2003/04–2008/09



Note: Proficiency rates include the meets proficiency and exceeds proficiency levels. Performance standards changed in 2004; the assessment based on the new standards changed in school year 2006/07.

Source: Authors’ analysis of Hawaii Department of Education data.

version of the assessment (2003/04–2005/06 and 2006/07–2008/09), especially the later one.

Over 2003/04–2005/06, the percentage of Native Hawaiian students scoring proficient in reading did not meet the state’s annual measurable objectives. Over 2006/07–2008/09, however, the percentage rose all three years (from 47.8 percent to 53.5 percent to 56.9 percent) but only met the annual measurable objective in 2006/07. For non-Native Hawaiian students, proficiency rates also increased (from 65.1 percent to 69.9 percent to 72.5 percent) and met annual measurable objectives in four of the six study years, including the three most recent years.

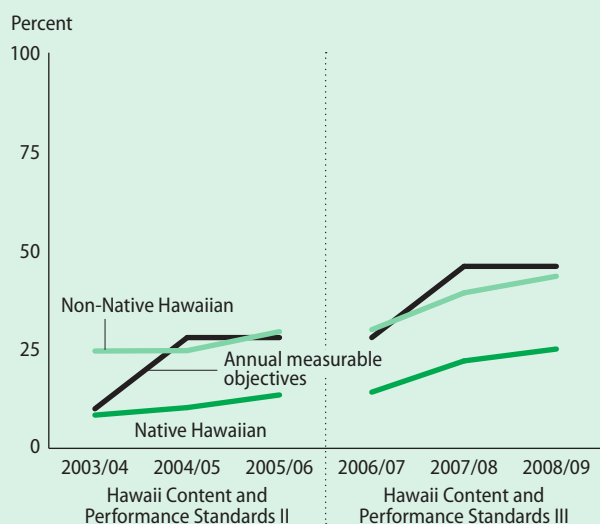
Reading proficiency among Native Hawaiian students rose at a rate comparable to that of non-Native Hawaiian students and surpassed it in some years. The gap narrowed in each of the most recent three years, from 17.3 percentage points to 16.4 percentage points to 15.6 percentage points, a total reduction of 1.7 percentage points.

**Math.** Non-Native Hawaiian students had higher math proficiency rates than did Native Hawaiian students in all six study years (figure 2). The gaps, slightly smaller than those for reading, fluctuated over the study years, ranging from a low of 14.4 percentage points in 2004/05 to a high of 18.4 percentage points in 2008/09.

Math proficiency rates increased over 2003/04–2008/09 among both Native Hawaiian and non-Native Hawaiian students, though not by as much as in reading: from 8.4 percent to 25.1 percent (16.7 percentage points) for Native Hawaiian students and from 24.6 percent to 43.5 percent (19.9 percentage points) for non-Native Hawaiian students.

Over both periods (2003/04–2005/06 and 2006/07–2008/09), the percentage of Native Hawaiian students scoring proficient in math never met the state annual measurable objectives. For non-Native Hawaiian students, math proficiency rates met the annual measurable objectives in 2003/04, 2005/06, and 2006/07.

FIGURE 2  
**Math proficiency rates for grade 8 Native Hawaiian and non-Native Hawaiian students on the Hawaii State Assessment, 2003/04–2008/09**



Note: Proficiency rates include the meets proficiency and exceeds proficiency levels. Performance standards changed in 2004; the assessment based on the new standards changed in 2006/07.

Source: Authors' analysis of Hawaii Department of Education data.

### Gaps and trends in reading and math at all four proficiency levels

**Reading.** A finer grained picture of the distribution of Native Hawaiian and non-Native Hawaiian students across all four proficiency levels over 2006/07–2008/09 shows that the percentage of Native Hawaiian students at the exceeds proficiency level rose 4.2 percentage points, while the percentage at the well below proficiency level fell 8.7 percentage points. A majority of Native Hawaiian students scored at the meets proficiency or exceeds proficiency levels in 2007/08 and 2008/09 (figure 3).

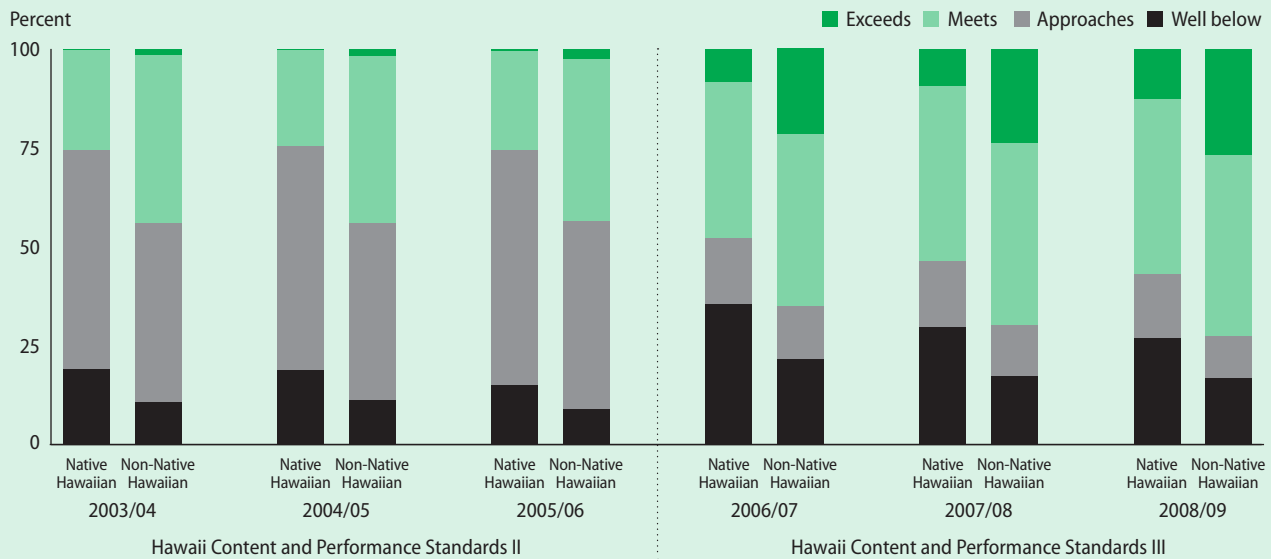
Only 0.2–0.6 percent of Native Hawaiian students scored at the exceeds proficiency level before 2006/07, but following implementation of the new HSA in 2006/07, the percentage rose each year, from 8.5 percent to 9.5 percent to 12.7 percent.

The percentage of non-Native Hawaiian students at the exceeds proficiency level in reading also rose more under the new HSA (from 21.5 to 27.0 percent, or 5.5 percentage points) than during the previous three years (from 1.5 to 2.7 percent, or 1.2 percentage points). Under the new HSA, the percentage of Native Hawaiian students at the exceeds proficiency level increased by less (4.7 percentage points). The percentage of students at the well below proficiency level, however, fell more for Native Hawaiian students (8.7 percentage points) than for non-Native Hawaiian students (4.8 percentage points).

Over 2006/07–2008/09, the achievement gap between Native Hawaiian and non-Native Hawaiian grade 8 students was widest—and growing—at the exceeds proficiency level (13.0, 14.4, and 14.3 percentage points). The gap at the well below proficiency level, though also wide, narrowed (14.0, 12.3, and 10.2 percentage points). The gap at the meets proficiency level also narrowed (4.3, 2.0, and 1.3 percentage points).

The largest change for both groups between the period before and that after the change in the HSA

FIGURE 3

**Distribution of grade 8 Native Hawaiian and non-Native Hawaiian students by reading proficiency level on the Hawaii State Assessment, 2003/04–2008/09**

Note: Performance standards changed in 2004; the assessment based on the new standards changed in 2006/07.

Source: Authors' analysis of Hawaii Department of Education data.

was the decrease in the percentage of students at the approaches proficiency level in reading (for example, from 59.3 percent in 2005/06 to 16.2 percent in 2008/09 for Native Hawaiian students and from 47.5 percent to 10.8 percent for non-Native Hawaiian students). For Native Hawaiian students, the second largest change between the two periods was the increase at the well below proficiency level. For non-Native Hawaiian students, the second largest was the increase at the exceeds proficiency level.

**Math.** In all six study years, Native Hawaiian students had lower proficiency rates in math than in reading. Adding to the discrepancy between math and reading was that half of Native Hawaiian students scored at the well below proficiency level (52.2–61.9 percent) over 2006/07–2008/09, despite a 9.7 percentage point decrease over the period (figure 4).

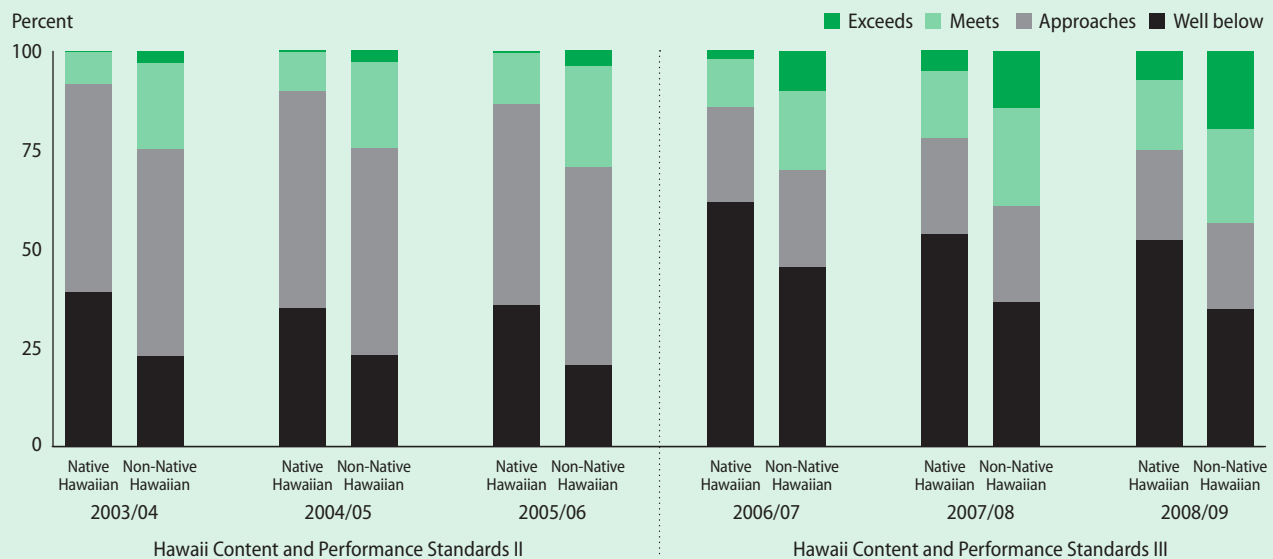
The percentage of Native Hawaiian students at the meets proficiency and exceeds proficiency levels in math showed an increasing trend under the old HSA and continued to rise under the new HSA. The only exception was in meets

proficiency in 2006/07, the first year under the new HSA, which had a slightly lower percentage (11.9 percent) than in 2005/06, the last year under the old HSA (12.9 percent). For each year over 2006/07–2008/09, the percentage of Native Hawaiian students at the meets proficiency and exceeds proficiency levels rose. It fell at the approaches proficiency level, except for a rise from 24.0 in 2006/07 to 24.1 in 2007/08.

In all six study years, both non-Native Hawaiian and Native Hawaiian students had math proficiency rates (see figure 4) far below their reading proficiency rates (see figure 3). Over 2006/07–2008/09, the percentage of non-Native Hawaiian students at the meets proficiency level rose 3.8 percentage points, and the percentage at the exceeds proficiency level rose 9.7 percentage points. As was the case for Native Hawaiians, the highest percentage of non-Native Hawaiians was at the well below proficiency level, though the share declined 10.7 percentage points over the three years.

Over 2006/07–2008/09, the widest (and growing) gaps between Native Hawaiian and non-Native

FIGURE 4

**Distribution of grade 8 Native Hawaiian and non-Native Hawaiian students by math proficiency level on the Hawaii State Assessment, 2003/04–2008/09**

Note: Performance standards changed in 2004; the assessment based on the new standards changed in 2006/07.

Source: Authors' analysis of Hawaii Department of Education data.

Hawaiian students were at the well below proficiency level (16.5, 17.2, and 17.5 percentage points). The gaps were also wide and growing at the exceeds proficiency level (7.9, 9.4, and 12.5 percentage points). The gaps were narrower and shrinking at the meets proficiency level (7.9, 7.8, and 6.2 percentage points).

Over the entire study period, the largest change in math proficiency rates between the previous HSA and the current HSA was an increase for both groups at the well below proficiency level, followed by a decrease at the approaches proficiency level.

## STUDY LIMITATIONS AND FUTURE RESEARCH

Several study limitations should be considered when interpreting the results. First, any study of student performance is affected by how comparison groups are defined. The inclusive definition of Native Hawaiian used in this study, which includes students of part-Hawaiian ancestry, while consistent with federal legislation and Hawaiian practice, can count Hawaiians in different ways

(Kana'iaupuni, Malone, and Ishibashi 2005a). As a result, part-Native Hawaiian are also part non-Native Hawaiian because students can have multiple ancestries. While giving Hawaiian ancestry primacy is accepted in both local custom and federal law, the picture might look very different with a more complex analysis that does not assign primacy to Hawaiian ancestry but focuses more on racial/ethnic differences and examines results for each of the many possible combinations. A group composed of part-Filipinos and full Filipinos, for example, would also include many part-Hawaiians. The same could be said of all other racial/ethnic groups in Hawaii.

Second, proficiency was measured with just one instrument, the HSA, and only reading and math were considered. Many other indicators of achievement—such as grade-level retention, graduation rates, grade point averages, achievement in the arts and athletics, and community service—were not considered. Analyses focusing only on assessment scores ignore important culture-based individual and community strengths and assets (Kana'iaupuni, Malone, and Ishibashi 2005a).



Third, this is a descriptive study. The findings document an achievement gap and the direction of six-year trends, but they cannot explain why the gap exists or how to narrow it. The study examines achievement levels, ignoring possible mediating factors. For example, it did not look at socioeconomic status or other variables that can affect education outcomes. There is evidence that mean household income is lower and the percentage of households in poverty is higher among Native Hawaiians than among other groups in Hawaii (Kana'iaupuni, Malone, and Ishibashi 2005b). Studies show that subsidized school lunch program participation correlates with academic achievement for both Native Hawaiian and non-Native Hawaiian students (Kana'iaupuni, Malone, and Ishibashi 2005b; Kamehameha Schools 2009). Non-Native Hawaiian students, however, score higher in both reading and math than Native Hawaiians in both the subsidized school lunch group and the nonparticipant group (Kamehameha Schools 2009).

Fourth, the HSA was based on one set of standards (HCPS II) for the first three study years and on another set (HCPS III) for the second three. The Hawaii Department of Education did not change the annual measurable objectives as the standards

changed, indicating a belief that the two sets of assessment results would be comparable. The final report from the assessment contractor to the Hawaii State Board of Education, however, clearly stated that the new assessment would likely affect student distribution across the four proficiency levels ("more students on HCPS III will exceed proficiency... [than] on HCPS II"; American Institutes for Research 2007). The two assessments cannot, therefore, be considered directly comparable. Gaps and trends can be compared, but the differences between the two assessments cannot be interpreted as true changes in proficiency levels.

Future research might examine the extent to which efforts by the Hawaii Department of Education to improve grade 8 reading and math proficiency are enabling more schools to reach annual measurable objectives. Another area for inquiry is the extent to which such efforts are affecting the achievement gap between Native Hawaiian and non-Native Hawaiian students in reading and math. Answers to these research questions may help explain why the gap is narrowing in reading but widening in math. Finally, further research is needed on why changes have been greater at some proficiency levels than at others.

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**NOTES**

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1. “The term ‘native Hawaiian’ means any individual who is (A) a citizen of the United States; and (B) a descendant of the aboriginal people who, prior to 1778, occupied and exercised sovereignty in the area that now comprises the State of Hawaii, as evidenced by (i) genealogical records; (ii) Kupuna (elders) or Kamaaina (long-term community residents) verification; or (iii) certified birth records” (Elementary and Secondary Education Act, Title VII, Section 7207).

## APPENDIX A DATA SOURCES AND STUDY METHODS

This appendix discusses the data sources and analysis.

### Data sources and collection

The primary data source for this study was the results for the standards-based Hawaii State Assessment (HSA) for grade 8 students for 2003/04–2008/09. These data were provided by the Hawaii Department of Education. Although the department collects data on the race/ethnicity of all students, it does not report HSA results by race/ethnicity at the student level and instead includes Hawaiian and part-Hawaiian in the category

“Native Hawaiian and other Pacific Islander” (which also includes Chinese, Filipino, Indo-Chinese, Japanese, Korean, and Samoan students). For this study, the department divided HSA data into two groups: Hawaiian and part-Hawaiian students in one group and all other (non-Native Hawaiian) students in another group.

To determine reading and math proficiency, the Hawaii Department of Education administers the HSA each spring to public school students in grades 3–8 and 10. Performance on the HSA is reported at four levels: well below proficiency, approaches proficiency, meets proficiency, and exceeds proficiency. Each level is defined by a score range, differentiated by cutscores (table A1). Students are considered proficient if they achieve either the

TABLE A1

#### Hawaii State Assessment grade 8 performance levels and cutscores in reading and math

Performance level	Cutscore	Score range	Description
<b>Reading</b>			
Exceeds proficiency	340	340 and higher	Students can use contextual information to analyze multiple meanings of words, draw conclusions about the reliability of information in texts, and explain an opinion about an author’s ideas or message.
Meets proficiency	300	300–339	Students can analyze new words, use organizational patterns to construct meaning while reading, and explain literary devices.
Approaches proficiency	286	286–299	Students can learn new words by using reading resources and annotations to identify main ideas and can identify themes and styles among authors.
Well below proficiency	285	285 and below	Students demonstrate skills and understanding of reading below the performance needed to reach the approaches proficiency level.
<b>Math</b>			
Exceeds proficiency	332	332 and higher	Students can use square or cube roots to solve problems, explain the use of appropriate units to measure area and volume, explain the use of the Pythagorean Theorem, use slope to describe a rate of change, and explain the validity of conjectures.
Meets proficiency	300	300–331	Students can compare and order rational numbers and square roots, use ratio and proportions to solve problems, apply the Pythagorean Theorem, solve linear equations with two variables, and judge the validity of conjectures based on experiments.
Approaches proficiency	276	276–299	Students can recognize whether situations involve square or cube roots, recall appropriate units to measure surface area and volume, recall the Pythagorean Theorem, and recognize linear relationships with two variables and valid data collection methods.
Well below proficiency	275	275 and below	Students demonstrate skills and understanding of math below the performance needed to reach the approaches proficiency level.

Source: American Institutes for Research 2007.

meets proficiency or exceeds proficiency level on the assessment. The state has set annual measurable objectives (target proficiency levels for meeting the requirements of the No Child Left Behind Act of 2001) for each year to 2013/14. Each state sets its own annual targets, but all targets must increase until they reach 100 percent by 2013/14.

The HSA has been administered since 2002/03, but the state standards governing the assessment—the Hawaii Content and Performance Standards (HCPS)—were changed in 2004, and the assessment was revised in 2006/07 (see box 2 in the main report). The results for both the HSA administered over 2003/04–2005/06 (based on HCPS II) and the HSA administered over 2006/07–2008/09 (based on HCPS III) were used to make this study as consistent as possible with Nelson, Greenough, and Sage (2009).

The Hawaii Department of Education's assessment contractor, American Institutes for Research (AIR), developed HCPS III and the concomitant changes to the HSA. AIR ran standard-setting workshops from February 26 to March 2, 2007. On March 8–9, 2007, the Hawaii State Assessment Technical Review Panel reviewed the workshop results, concluding that the procedures used to develop the new standards were appropriate and technically rigorous. AIR used the bookmark method, a commonly applied procedure, for generating new HSA cutscores. The Hawaii Board of Education approved the new cutscores on April 19, 2007 (see table A1).

Grade 8 reading and math HSA performance data for Native Hawaiian and non-Native Hawaiian students were obtained from the Hawaii Department of Education. No data were personally identifiable.

TABLE A2

### Reading proficiency rates for grade 8 Native Hawaiian and non-Native Hawaiian students on the Hawaii State Assessment, 2003/04–2008/09

#### Number

Proficiency level	2003/04			2004/05			2005/06			2006/07			2007/08			2008/09		
	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total
Exceeds	8	153	161	13	182	195	21	264	285	304	2,038	2,342	334	2,300	2,634	420	2,485	2,905
Meets	985	4,401	5,386	812	3,979	4,791	895	3,983	4,878	1,409	4,132	5,541	1,540	4,427	5,967	1,459	4,183	5,642
Approaches	2,139	4,671	6,810	1,904	4,221	6,125	2,120	4,625	6,745	595	1,274	1,869	590	1,221	1,811	535	992	1,527
Well below	741	1,110	1,851	637	1,069	1,706	538	867	1,405	1,277	2,037	3,314	1,038	1,667	2,705	888	1,540	2,428
Total	3,873	10,335	14,208	3,366	9,451	12,817	3,574	9,739	13,313	3,585	9,481	13,066	3,502	9,615	13,117	3,302	9,200	12,502

#### Percent

Proficiency level	2003/04			2004/05			2005/06			2006/07			2007/08			2008/09		
	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total
Exceeds	0.2	1.5	1.1	0.4	1.9	1.5	0.6	2.7	2.1	8.5	21.5	17.9	9.5	23.9	20.1	12.7	27.0	23.2
Meets	25.4	42.6	37.9	24.1	42.1	37.4	25.0	40.9	36.6	39.3	43.6	42.4	44.0	46.0	45.5	44.2	45.5	45.1
Approaches	55.2	45.2	47.9	56.6	44.7	47.8	59.3	47.5	50.7	16.6	13.4	14.3	16.8	12.7	13.8	16.2	10.8	12.2
Well below	19.1	10.7	13.0	18.9	11.3	13.3	15.1	8.9	10.6	35.6	21.5	25.4	29.6	17.3	20.6	26.9	16.7	19.4

Note: Percentages may not sum to 100 because of rounding.

Source: Hawaii Department of Education data.

TABLE A3

**Math proficiency rates for grade 8 Native Hawaiian and non-Native Hawaiian students on the Hawaii State Assessment, 2003/04–2008/09****Number**

Proficiency level	2003/04			2004/05			2005/06			2006/07			2007/08			2008/09		
	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total
Exceeds	15	312	327	10	267	277	21	391	412	82	967	1,049	179	1,398	1,577	244	1,834	2,078
Meets	310	2,236	2,546	337	2,069	2,406	462	2,481	2,943	425	1,881	2,306	594	2,380	2,974	585	2,170	2,755
Approaches	2,035	5,408	7,443	1,842	4,935	6,777	1,813	4,875	6,688	859	2,326	3,185	845	2,315	3,160	748	2,004	2,752
Well below	1,513	2,379	3,892	1,177	2,180	3,357	1,278	1,992	3,270	2,219	4,307	6,526	1,884	3,522	5,406	1,725	3,192	4,917
Total	3,873	10,335	14,208	3,366	9,451	12,817	3,574	9,739	13,313	3,585	9,481	13,066	3,502	9,615	13,117	3,302	9,200	12,502

**Percent**

Proficiency level	2003/04			2004/05			2005/06			2006/07			2007/08			2008/09		
	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total	Native Hawaiian	Non-Native Hawaiian	Total
Exceeds	0.4	3.0	2.3	0.3	2.8	2.2	0.6	4.0	3.1	2.3	10.2	8.0	5.1	14.5	12.0	7.4	19.9	16.6
Meets	8.0	21.6	17.9	10.0	21.9	18.8	12.9	25.5	22.1	11.9	19.8	17.6	17.0	24.8	22.7	17.7	23.6	22.0
Approaches	52.5	52.3	52.4	54.7	52.2	52.9	50.7	50.1	50.2	24.0	24.5	24.4	24.1	24.1	24.1	22.7	21.8	22.0
Well below	39.1	23.0	27.4	35.0	23.1	26.2	35.8	20.5	24.6	61.9	45.4	49.9	53.8	36.6	41.2	52.2	34.7	39.3

Note: Percentages may not sum to 100 because of rounding.

Source: Hawaii Department of Education data.

## Data analysis

Data tables from the Hawaii Department of Education contained both numbers and percentages of students scoring at each proficiency level (tables A2 and A3). Percentages were calculated based on the numbers of Native Hawaiian and non-Native Hawaiian students tested each year.

The first analysis merged the top two proficiency levels (meets proficiency and exceeds proficiency) to create a single proficiency rate for comparison across years, as in Nelson, Greenough, and Sage (2009). This is also how state data are submitted to the U.S. Department of Education in the Consolidated State Performance Plans under the No Child Left Behind Act of 2001.

Next, the proficiency rates for grade 8 reading and math were plotted over 2003/04–2008/09, comparing the performance of Native Hawaiian and non-Native Hawaiian students with annual measurable objectives. These graphs can be compared with the state findings in Nelson, Greenough, and Sage (2009). The slope of the proficiency rate data indicates trends across the study period. Because the data represent the universe of students in grade 8 in Hawaii for each year, inferential statistics are not required for demonstrating trends.

Finally, two graphs were created to display the percentages of Native Hawaiian and non-Native Hawaiian students for each proficiency level in reading and math.

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